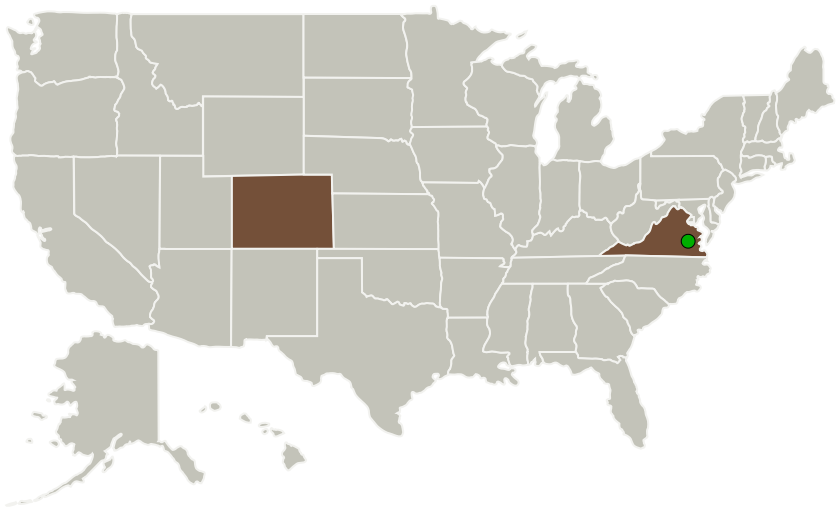
Frequency-Stable Offset-Locked Lasers for ASCENDS and 3D Winds, Phase I

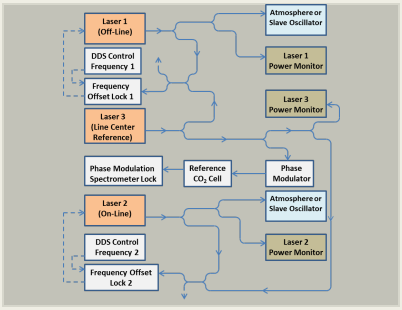
Completed Technology Project (2014 - 2014)

Project Introduction

We propose the potential to develop significant improvements to size, weight, and prime power requirements of front-end cw lasers and associated frequency stabilization and offset-locking photonics and electronics that are utilized in laser-based remote sensing systems for the measurement of atmospheric CO2 concentrations and wind velocity. The emphasis in the proposed program is to develop stable front-end sources for 2-micron wavelength systems, but it is anticipated that much of the design will be readily applicable to a broad array of short-wave IR wavelengths, e.g. 1.57 micron, by the use of alternative laser gain media. Although the Phase I design and Phase II implementation will be aimed at airborne platforms, only designs that have a clear and practical path to future space-based implementation will be considered. The Beyond Photonics team is uniquely qualified to explore the state-of-the-art in relevant lasers and frequency stabilization techniques and develop improved front-end systems that have a demonstrable path to robust, compact airborne and space-based applications. Our team's deep experience with such systems lends a perspective that will yield significant gains in system compactness, efficiency, and autonomous reliability for a wide array of applications relevant to NASA's missions, and improve the viability for other commercial and military applications in eye-safe remote sensing.

Primary U.S. Work Locations and Key Partners





Frequency-Stable Offset-Locked Lasers for ASCENDS and 3D Winds Project Image

Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Frequency-Stable Offset-Locked Lasers for ASCENDS and 3D Winds, Phase I

Completed Technology Project (2014 - 2014)

Organizations Performing Work	Role	Type	Location
Beyond Photonics LLC	Lead Organization	Industry	Lafayette, Colorado
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Colorado	Virginia

Project Transitions

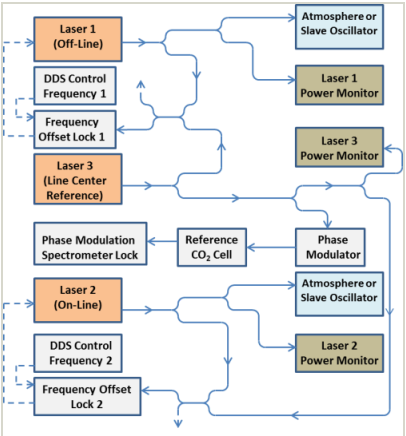
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137600)*

Images



Project Image
Frequency-Stable Offset-Locked Lasers for ASCENDS and 3D Winds Project Image *(https://techport.nasa.gov/image/136184)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Beyond Photonics LLC

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

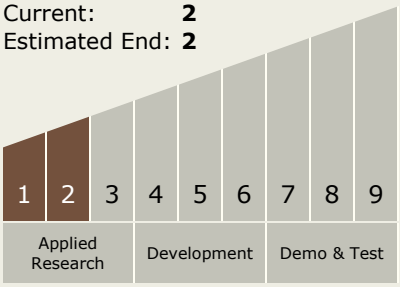
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Sammy Henderson

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**



Frequency-Stable Offset-Locked Lasers for ASCENDS and 3D Winds, Phase I

Completed Technology Project (2014 - 2014)

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System